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TECHNICAL NOTE

Task Order HT-129
Contract NAS 9-11500

Flight Test Comparison of Film Type SO-289
and Film Type 2424 in the AMPS Camera

Prepared By

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(NASA-CR-144465) FLIGHT TEST COMPARISON OF
FILM TYPE SO-289 AND FILM TYPE 2424 IN THE
AMPS CAMERA (Technicolor Graphic Services,
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FLIGHT TEST COMPARISON OF FILM TYPE SO-289
AND FILM TYPE 2424 IN THE AMPS CAMERA

This report has been reviewed
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FLIGHT TEST COMPARISON OF FILM TYPE S0-289
AND FILM TYPE 2424 IN THE AMPS CAMERA

A flight test was conducted to determine the suitability of S0-289 Multi-spectral Infrared Aerial Film for Earth Resources' use. It was directly compared to film type 2424, Infrared Aerographic Film, the IR film in current use.

Table I gives the exposure parameters for both films.

TABLE I

Film Type	S0-289	2424
Emulsion Number	4-1	56-12
Camera	AMPS Station #1	AMPS Station #2
Filter	CC (0.7 to 0.8 μ)	DD (0.8 to 0.9 μ)
f/stop	4.8	11.0
Shutter Speed	2.5, 3.5, 5.0, 7.0, 10.0 msec	2.5, 3.5, 5.0 7.0, 10.0 msec

FLIGHT DATA

Aircraft - P3 - NASA 927
Altitude - 21,000 feet
Ground Speed - 300 knots
Atmosphere - Clear

A series of ten frames was taken at each shutter speed over a vegetated area. The shutter speed changes represent 1/2 stop exposure increments.

A close examination of S0-289 imagery failed to show the halation which had been evident in earlier tests of this film. Figures 1 to 3 are 11X prints from the S0-289 and 2424. Much higher resolution and lower granularity are evident in the S0-289 imagery. The 2424 image in Figure 2 was about 1/2 stop overexposed, while Figure 3 was properly exposed. Even in the properly exposed image, however, the 2424 is far inferior to the S0-289.

The S0-289 film should have an advantage in the I²S camera, since it has a very flat spectral sensitivity and almost constant gamma as a function of wavelength (Figure 4).

The one disadvantage of S0-289 is its low film speed. It is approximately 2-1/2 to 3 stops slower than 2424 (Figure 5). While this is not a problem in the AMPS camera, it would be borderline for the Zeiss. An approximate exposure for the Zeiss camera would be f/4 @ 1/150 with an 89B filter and 36% AV filter.

Processing characteristics are somewhat unusual for S0-289. The film speed and gamma change very little with changes in development time. The curves in Figure 6 show a speed increase of only one-half stop, and a gamma change of 0.15 when the development time is tripled. Further increases in development time produce excessive fog. These processing characteristics are advantageous from the point of view of process control, but limit the amount of contrast control available.

The S0-289 film appears to be a definite improvement over 2424. Even in cameras which cannot fully utilize the film's resolution capability, the greatly reduced granularity is a significant advantage.

It is recommended that 2424 film be replaced by S0-289 for Earth Resources' photography. It would be desirable, however, to maintain a small stock of 2424 for special applications where S0-289 has insufficient sensitivity.

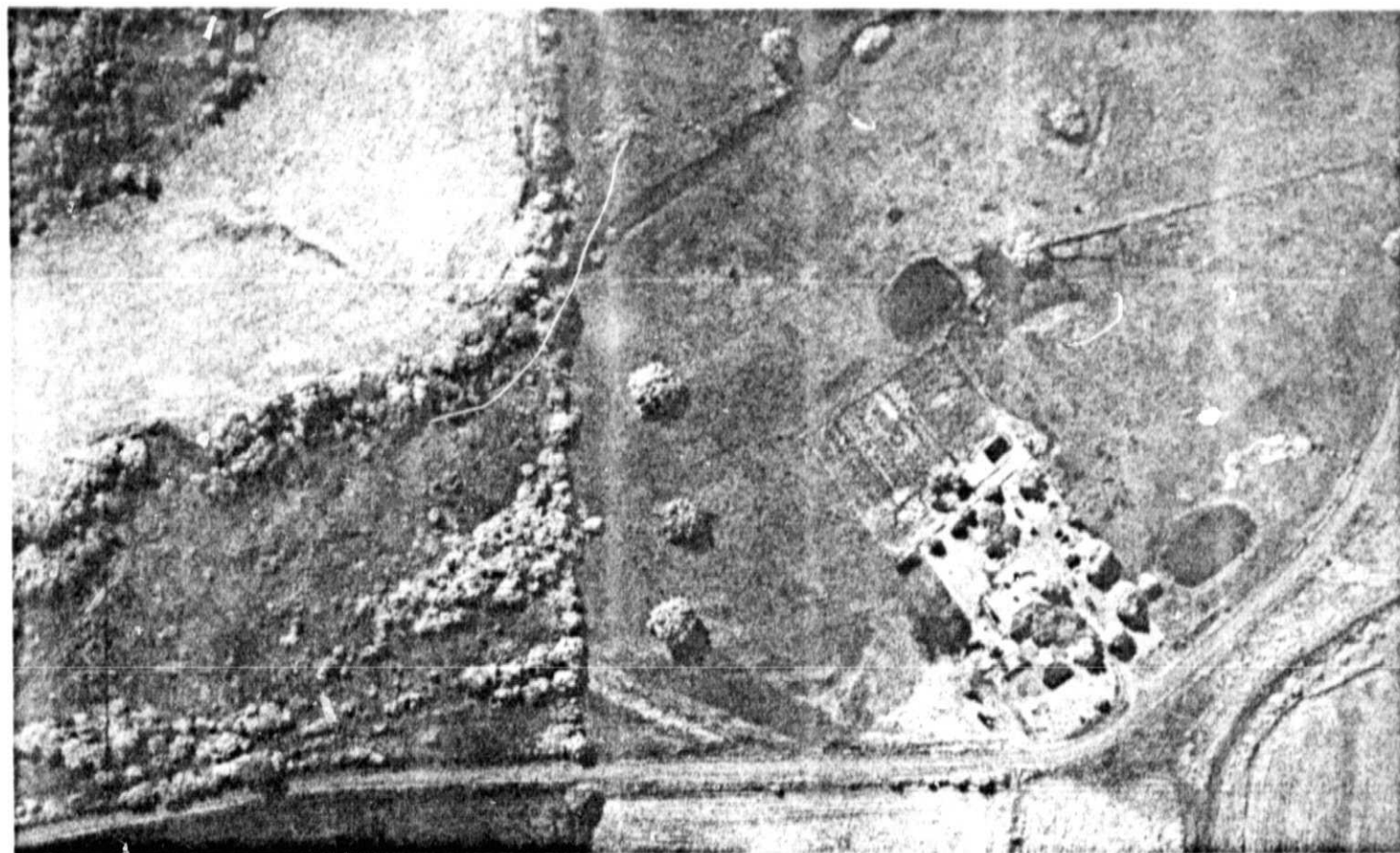


FIGURE 1

Film Type S0-289
11X Print
Properly Exposed Original

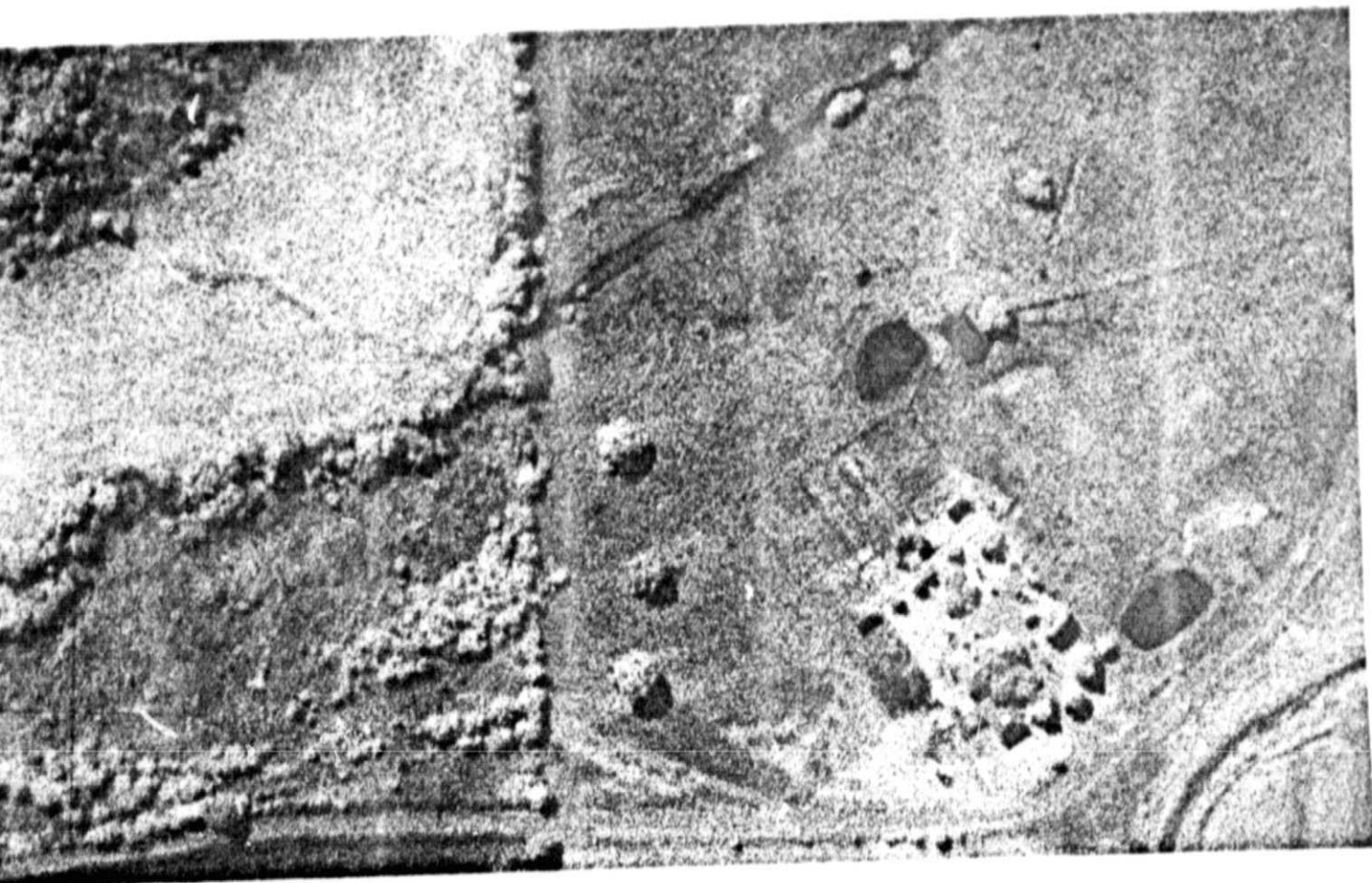


FIGURE 2

Film Type 2424
11X Print
1/2 Stop Overexposed Original

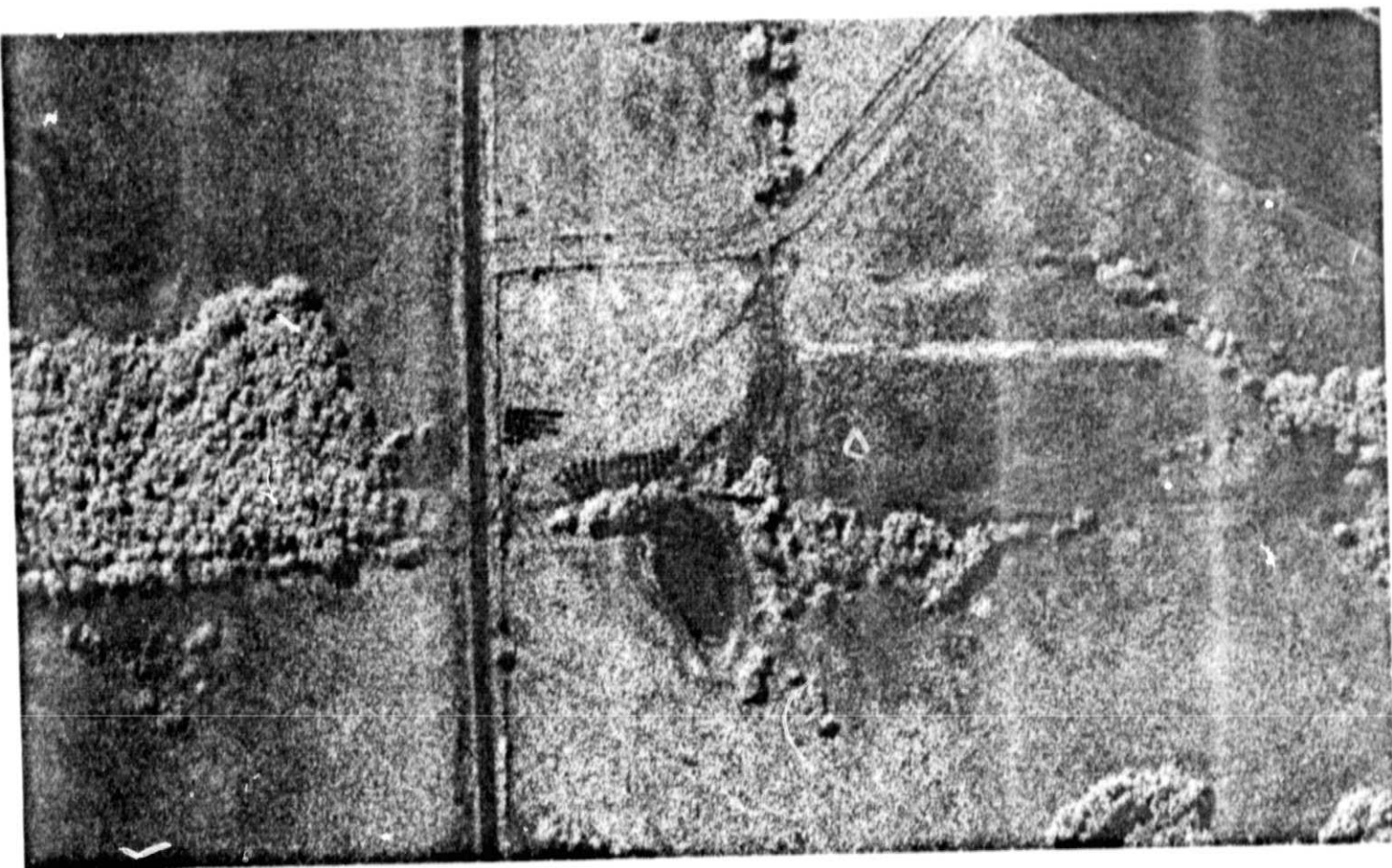


FIGURE 3

Film Type 2424
11X Print
Properly Exposed Original

FIGURE 4
S0-289 Filter Series

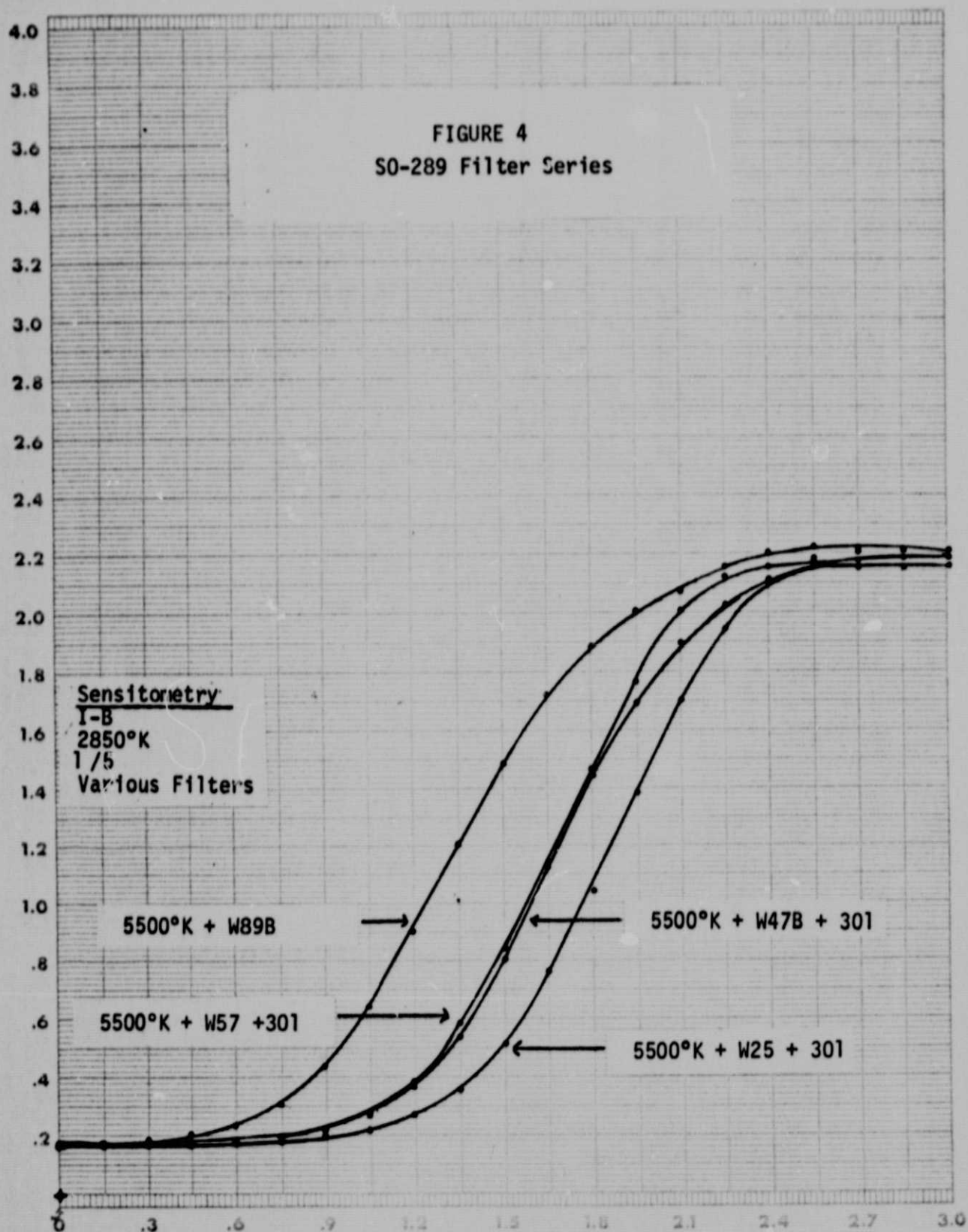
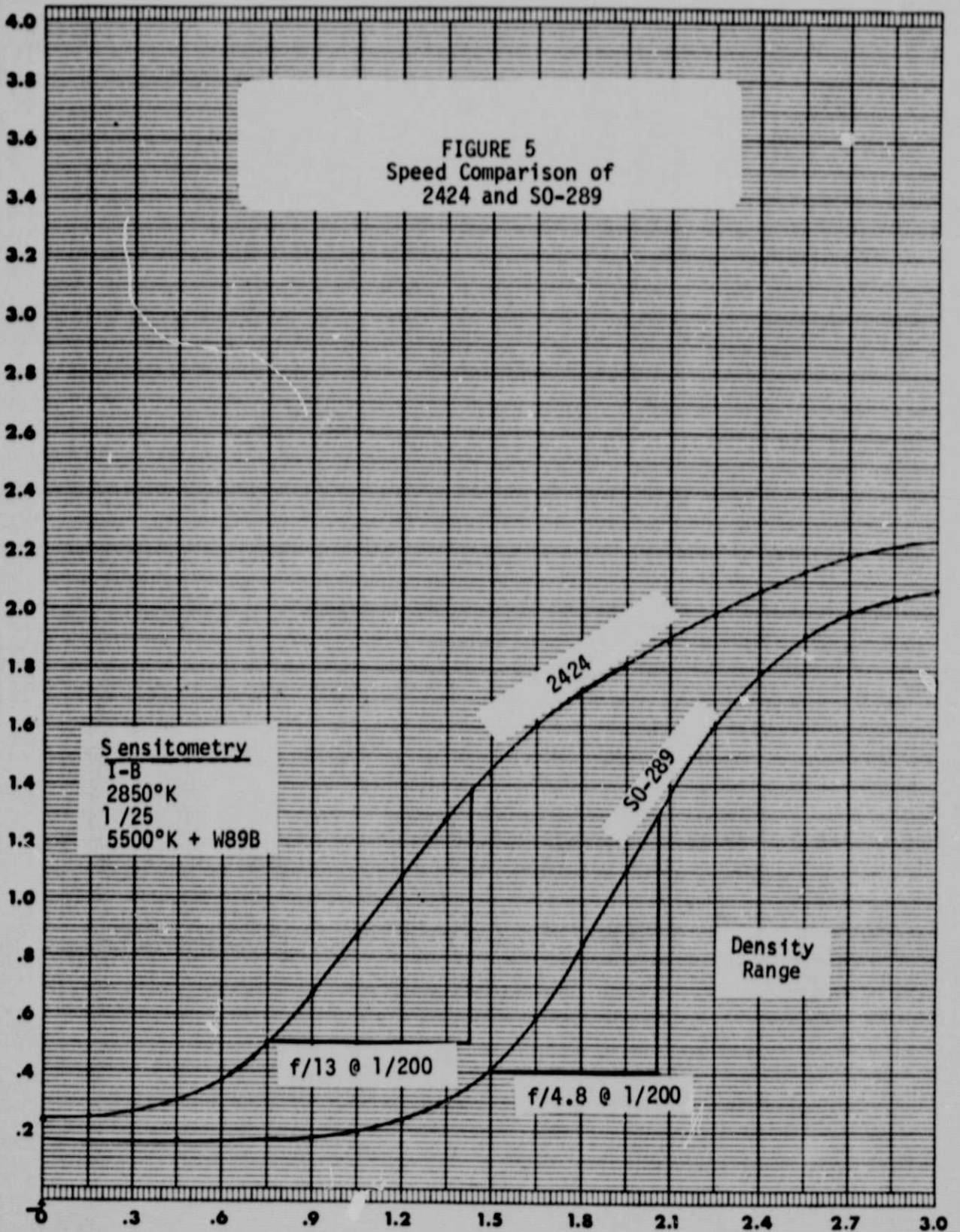


FIGURE 5
Speed Comparison of
2424 and S0-289



EXPOSURE DATA			PROCESSING DATA			DENSITOMETRY		
SENSITOMETER	I-B		PROCESSOR	VMT 11C-M		INSTRUMENT	MacBeth	
ILLUMINANT	2850	°K	CHEMISTRY	MX-641		TYPE	TD504	
TIME	1/10	SEC.	SPEED		TANKS	APERTURE SIZE	3	
FILTER	5500°K + 89B		TEMP	85	TIME	FILTER	Visual	
							BASE + FOG	

